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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/605,271	06/28/2000	Christopher Henry Rohrs	200308340-1	5332

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EXAMINER

ABEL JALIL, NEVEEN

ART UNIT

PAPER NUMBER

2175

DATE MAILED: 07/27/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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## Office Action Summary

Application No.

09/605,271

Applicant(s)

ROHRS, CHRISTOPHER HENRY

Examiner

Neveen Abel-Jalil

Art Unit

2175

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on May 21, 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

  
DOV POPOVICI

SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2100

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_

- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

1. The amendment filed on May 21, 2004 has been received and entered. Claims 1-26 are pending.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1, 9, 17, and 25-26 are rejected under 35 U.S.C. 102(e) as being anticipated by Alpern et al. (U.S. Patent No. 6,470,361 B1).

As to claims 1, 9, 17, and 25-26, Alpern et al. discloses a collector for collecting non-referenced objects stored in a heap by a program executing in a computer system comprising:

an object allocation routine which stores an object of a particular type in one of a plurality of logical partitions in the heap dependent on a predefined category assigned to the object type, such that each object of a certain category is stored in one logical partition of the heap and objects of a category different from the certain category are stored in a logical partition different from the one logical partition (See column 3, lines 23-65, also see column 5, lines 33-67, and see column 6, lines 1-26); and

a collection routine which searches one of the logical partitions of the heap for objects to which references are made and reclaims non-referenced objects stored in the searched logical partition of the heap (See columns 22, lines 62-67, and column 23, lines 1-24, also see column 4, lines 23-67).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. Claims 2-3, 6-8, 10-11, 14-16, 18-19, and 22-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alpern et al. (U.S. Patent No. 6,470,361 B1) in view of Engelstad et al. (U.S. Patent No. 5,485,613).

As to claims 2, 10 and 18, Alpern et al. discloses further comprising:

a sample and logical partition routine which defines a category of an object stored in the heap logical partition (See Alpern et al. column 21, lines 17-45).

Alpern et al. does not teach in the heap to be hot or cold.

Engelstad et al. teaches in the heap to be hot or cold (See Engelstad et al. column 9, lines 5-19, wherein “hot” reads on “permanent”, and wherein “cold” reads on “temporary”, and see Engelstad et al. column 27, lines 52-67, and Engelstad et al. column 28, lines 1-6, wherein “heap” reads on “memory” since a heap is defined by --dictionary.com as an area of memory used for dynamic memory allocation where blocks of memory are allocated and freed in an arbitrary order and the pattern of allocation and size of blocks is not known until run time).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Alpern et al. to include in the heap to be hot or cold.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Alpern et al. by the teaching of Engelstad et al. to include in the heap to be hot or cold because dividing and indicating the heap by age mortality of the object reduces memory processing and freeing up memory storage space.

As to claims 3, 11 and 19, Alpern et al. as modified discloses wherein upon determining that a hot logical partition is full (See Alpern et al. column 15, lines 15-65), the collection routine searches a cold logical partition and the hot logical partition (See Engelstad et al. column 23, lines 14-36, wherein “searches” reads on “scanned”, and Engelstad et al. column 9, lines 5-19, wherein “hot” reads on “permanent”, and wherein “cold” reads on “temporary”) for referenced objects and moves referenced objects (See Engelstad et al. column 24, lines 13-27) of the hot category stored in the hot logical partition to the cold logical partition (See Engelstad et al. column 9, lines 5-19, wherein “hot” reads on “permanent”, and wherein “cold” reads on “temporary”).

As to claims 6, 14 and 22, Alpern et al. as modified discloses wherein the sample and partition routine defines the object category dependent on object type mortality (See Engelstad et al. column 3, lines 1-16, wherein “mortality” reads on “time of creation”, also see Alpern et al. column 13, lines 10-42).

As to claims 7, 15 and 23, Alpern et al. as modified discloses wherein the sample and partition routine estimates the object mortality (See Engelstad et al. column 3, lines 1-16, wherein “mortality” reads on “time of creation”) dependent on difference of the number of bytes of the object type stored in the heap before a collection and the number of bytes of the object type stored in the heap after the collection (See Alpern et al. column 18, 39-67, and see Alpern et al. column 18, lines 1-31).

As to claims 8, 16 and 24, Alpern et al. as modified discloses wherein the sample and partition routine partitions the heap to minimize intergenerational pointers (See Engelstad et al. column 16, lines 35-55, wherein “intergenerational” reads on “previous ...next”) between a hot logical partition and a cold logical partition (See Engelstad et al. column 9, lines 5-19, wherein “hot” reads on “permanent”, and wherein “cold” reads on “temporary”).

6. Claims 4-5, 12-13, and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alpern et al. (U.S. Patent No. 6,470,361 B1) in view of Engelstad et al. (U.S. Patent No. 5,485,613) as applied to claims 2-3, 6-8, 10-11, 14-16, 18-19, and 22-24 above, and further in view of Endicott et al. (U.S. Patent No. 6,047,295).

As to claims 4, 12 and 20, Alpern et al. as modified discloses wherein the sample and partition further comprises:

for intergenerational pointers (See Alpern et al. abstract, also see Alpern et al. column 3, line 54-67, and see Engelstad et al. column 16, lines 35-55, wherein “intergenerational” reads on “previous ...next”) between an object stored in a hot logical partition and an object stored in a cold logical partition (See Engelstad et al. column 9, lines 5-19, wherein “hot” reads on “permanent”, and wherein “cold” reads on “temporary”).

Alpern et al. as modified still does not teach a write barrier elimination routine, which eliminates a write barrier.



Endicott et al. teaches a write barrier elimination routine, which eliminates a write barrier (See Endicott et al. column 12, lines 1-14, also see Endicott et al. column 10, lines 11-20, and Endicott et al. column 10, lines 48-59).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified Alpern et al. as modified to include a write barrier elimination routine, which eliminates a write barrier.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have further modified Alpern et al. as modified by the teaching of Endicott et al. to include a write barrier elimination routine, which eliminates a write barrier because providing a write barrier ensure proper synchronization with the garbage collector and protect data from being lost thereby reducing overhead.

As to claims 5, 13 and 21, Alpern et al. as modified discloses wherein the write barrier elimination routine eliminates a write barrier by replacing a write barrier machine code instruction with a no operation machine code instruction (See Endicott et al. column 12, lines 1-14, also see Endicott et al. column 10, lines 11-20, and Endicott et al. column 10, lines 48-59, also see Alpern et al. column 14, lines 6-30).

### ***Response to Arguments***

7. Applicant's arguments filed on May 21, 2004 have been fully considered but they are not persuasive.

Applicant's argument on pages 3 and 4 that "Alpern does not disclose an object application routine which stores an object of a particular type in one of a plurality of logical partitions in the heap" is fully acknowledged but is not deemed to be persuasive.

The Examiner points to the combination of Alpern with Engelstad to assert that the combined reference disclose an object application routine which stores an object of a particular type in one of a plurality of logical partitions in the heap; particularly, Alpern in column 1, lines 63-67, and column 2, lines 1-10, prior art, the program code and data stored in main memory refers to objects. The term "object" is defined in Alpern to mean any data structure created by a process. It is well known that data structure in objected oriented database programming assign object type that can be user defined in reference to the objects in an object class. Alpern teaches object classes which are categories of objects that can be grouped together by object type. Engelstad in column 16, lines 18-55 goes further and specifically teach each generation 630 is defined by a data structure of the type represented by Table 2.

Applicant's argument on page 5 that "no teaching or suggestion in Engelstad for performing garbage collection based on object type, the combination of Alpern and Engelstad provides no such teaching" is fully acknowledged but is not deemed to be persuasive.

The Examiner respectfully points to Engelstad column 16, lines 18-55, wherein each generation 630 is defined by a data structure of the type represented by Table 2, is disclosed. Engelstad also teaches a data structure is used to identify the objects in the generation, and the generation itself. Engelstad in column 15, lines 60-67, and column 16, lines 1-17 goes further to

disclose references associated with class objects and object descriptors, which is interpreted by the examiner to read on object types. According to [www.dictionary.com](http://www.dictionary.com), object type is defined as a type is a classification of data that tells the compiler or interpreter how the programmer intends to use it. Alpern in column 2, lines 1-10, prior art, teaches object class and data definitions. Therefore, the combination of Alpern and Engelstad does teach performing garbage collection based on object type.

### ***Conclusion***

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Neveen Abel-Jalil whose telephone number is 703-305-8114. The examiner can normally be reached on 8:30AM-5:30PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on 703-305-3830. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Neveen Abel-Jalil  
July 12, 2004

  
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